NUCLEAR WASTE MANAGEMENT PROGRAM PROCEDURE

SP 20-1
WASTE SURROGATE DEVELOPMENT: SAMPLE MATERIAL ACQUISITION AND PREPARATION
Revision 0

Effective Date: 06/08/99

Author: Deborah S. Coffey *Original signed by Deborah S. Coffey* *5-26-1999*
(printed name) (signature) date

1.0 Purpose and Scope

The purpose of this procedure is to 1) define the methods of acquiring materials for preparing samples to be tested in the vertical sediment flume and drum crush testing, 2) define the method of sample preparation, and 3) define handling and storage procedures for materials and samples in support of laboratory experimentation.

The scope of this procedure applies to the procurement or acquisition of raw materials, and the handling, preparation, tracking and storage of samples developed from those materials. Samples created under this procedure will be used for sediment flume and drum crush testing experiments.

Acronyms and definitions not located in the glossary will be defined in the text of this procedure. Some acronyms and definitions used in this procedure are contained in the Nuclear Waste Management Program (NWMP) Glossary located by accessing the Sandia National Laboratories (SNL) NWMP On-Line Documents website which also provides access to controlled documents [NWMP procedures (NPs), Activity/Project Specific Procedures (SPs), forms, controlled documents such as technical operating procedures, and other quality assurance (QA) program information]. Website access is obtained by using either of the following:

http://www.nwmp.sandia.gov

or alternatively,

http://132.175.140.247/onlinedocuments

2.0 Implementation Actions

2.1 Prerequisites

The QA and environmental health and safety (ES&H) requirements that are prerequisites for this work are listed below.

2.1.1 Quality Assurance

All personnel providing technical support to WIPP are required to follow the Sandia Waste Isolation Pilot Plant (WIPP) QA Program as described in the document, "*U.S. Department of Energy, Carlsbad Area Office, Quality Assurance Program Document, CAO-94-1012,* most recent revision (revision 2 is currently in effect). The implementation of the Carlsbad Area Office (CAO) QA Program Document (QAPD) by the Sandia WIPP QA Program is through NPs. All personnel working under this procedure (SNL staff, contractors) will be required to view the Annual Refresher Training Video and complete forms NP 2-1-1 (Qualification and Training Form) and NP 2-1-2 (QA Training Roster) *prior to* beginning work.

All participants will be required to read this and any other pertinent procedure prior to beginning work. A copy of any required pertinent procedures will be available in the work area. The procedure for initiating, using and completing a scientific notebook, NP 20-2, most recent revision is required to be read and followed for this work activity.

2.1.2 Environmental Health and Safety (ES&H)

There are no specific required safety procedures applicable to this work. However, basic environmental health and safety knowledge applies. All participants should have completed

ESH 100 ES&H Awareness

All participants are encouraged to assess work area hazards and protect themselves by wearing personal protective equipment (leather gloves, safety glasses, face shields, latex gloves. etc.) if indicated by the work being performed. Assessed hazards include assembly of materials that might have rough or sharp edges, cutting of these materials to size creating rough or sharp edges, use of hack saws or operation of skill saws, use of load cells to provide a confining pressure, use of band saws to fabricate samples to specific sizes, and other general work area hazards such as slipping or falling.

The assembly of waste surrogate materials will be conducted in Building 6600 in Technical Area 3. The work will done under the supervision of Dan Lucero (6832) under the operating and ES&H procedures approved for use in that facility. These documents are available in Building 823, Room 2431 and in the Building 6600 Laboratory. The acquisition of materials will be from or around Sandia as much as possible. However, materials may be collected from construction sites, laboratories, and other locations in the Albuquerque area.

Document Number	Title
PHS	Preliminary Hazard Screening (PHS) for Sandia
SNL8A00204	Tomography and Radioactive Transport Laboratory
SP471436	Research in the Sandia Tomography and Radioactive Transport Laboratory – Normal Operation

Sample compaction for the vertical sediment flume samples will be done in the Geomechanics Laboratory in Building 849 in Technical Area 1. The work will done under the supervision of Nancy Brodsky (6117)

under the operating and ES&H procedures approved for use in that facility. These documents are available in Building 823, Room 2490 and in the Geomechanics Laboratory in Building 849

Document Number	Title
PHS 9720546929-002	Geotechnology Research Facility
OP-6117-1100	Operating Procedure for the 5 MN (1100 KIP) Triaxial Testing System

2.1.2.1 General Safety

The following general safety guidelines (SAIC, 1989) are applicable:

(a) All individuals working in the laboratory on any potentially hazardous activity are required to wear safety glasses. In addition, visitors to the laboratory shall also wear safety glasses when in the vicinity of an in-progress hazardous activity.
(b) Complicated tasks should not be rushed. This can lead to accidents.
(c) Do not lift overly heavy objects. Use mechanical assistance, or ask another person to help.
(d) Lift heavy objects using the legs for muscle power, and not the back.
(e) Wear leather gloves for moving, carrying, and lifting objects with sharp edges or rough surfaces.
(f) Avoid working alone in the laboratory. Always be sure someone knows that you are working in the facility.
It is critical that no personnel work alone in the laboratory, especially with electrical or hydraulic equipment in operation unless all of the following criteria are met:
- The equipment is fully shielded.
- Personnel have proven competence in the operation of equipment.
- A person outside of the laboratory has knowledge of the person working alone, the circumstances, and the time required to complete the task.

(g) Do not operate equipment while wearing loose clothing or dangling jewelry. Do not let long hair hang loosely where it might get caught in the equipment.
(h) Prior to operating equipment, make sure that machine guards and barriers are in place.
(i) Do not attempt to make or break pressure connections while there is any chance that the system is pressurized.
(j) All compressed gas bottles must be securely fastened and chained. Safety caps must be in place when bottles are not in use.
(k) Ensure that all tubing, hoses, fittings, and components are rated for the intended pressure of use. Use extra caution with pressurized gas systems. Have a second person check over any newly constructed system prior to its operation and routine use.
(l) New equipment operators should read instruction manuals and be checked out by a knowledgeable operator on the proper operating procedures for the equipment.
(m) Spilled liquids must be cleaned up as soon as possible/practical by those responsible for the spill. Determine if the liquid is hazardous or not prior to cleaning up. If in doubt, ask someone who knows.
(n) Know where first aid kits, spill clean up kits, eye washes and fire extinguishers are located.
(o) If a dust is present, wear filter masks while handling the material.
(p) All new personnel should be given a tour of the laboratory and a summary of any expected work hazards, including a discussion of what personal protective equipment (PPE) is required. Locations of PPE should be pointed out and demonstrations of how to use PPE provided.
(q) Personnel must read and sign off on any applicable technical and safety procedures.
(r) EMERGENCY TELEPHONE NUMBERS

7-911 Fire, Police, Ambulance
844-4189 On-Duty Incident Commander
Non-emergencies
7- 311 or 844-6515

2.1.2.2 Hazards

There are no toxic/hazardous chemicals associated with this work.

2.2 Environmental Conditions

All work will be conducted in a laboratory environment with adequate lighting, and at ambient temperatures. There are no specific requirements for temperature or other environmental conditions. The laboratory area where samples are assembled should be clean and relatively free of dust. Good housekeeping practices are expected. Raw materials and samples are required to be stored under conditions that will not affect the weight and composition of the materials or samples. Sample integrity must be maintained to keep the samples free from pests, insects, dust and dirt. Although there are no specific temperature requirements for materials or sample storage, samples must not be stored in temperature extremes causing brittleness, melting, or other conditions affecting integrity. Also, materials and samples must be stored in areas that are not open to the weather or where excessive humidity or moisture might affect the materials or samples or sample labeling.

2.3 Equipment Descriptions and Use

The following table lists the equipment expected to be used in obtaining sample compositions (by weight) and during sample fabrication. Equipment requiring calibration is identified and calibration methods and frequencies are specified.

Equipment	Measure	Calibration	Primary Standard	Secondary Standard
Building 6600				
Sartorious Balance 1465 SN 3505161	Range 0-420g	The balance will be annually calibrated by The Sandia Primary Standards Laboratory (PSL) and the calibration certificate will be on file in the project records.	The primary standard is defined in the PSL's procedure for balance calibration. NIST-traceable weights will be used.	Continuing calibration will be verified at least once per session or when the operating range significantly changes. Balance calibration and operation are specified in SP 20-3, Calibration Use and Maintenance of Balances Used for Waste Surrogate Development Weights Fisher Scientific 1-2000g SN-2166
Mettler Balance PK 60 S/N40220	Range 0-60,000g			
Mettler Balance PM 1200 SN 1113380229	Range 0-1200g			
35 mm or digital camera	Photographic documentation of sample materials, sample compositions, sample compaction, and final sample morphology will be provided	A measurement scale will be used whenever possible and in-the-picture tags will be used to provide labeling of photographs.	NA. Indoor film or a digital camera will be used.	NA. A photo log will be created and provided in the final data package.
Video camera	Video documentation of sample materials, sample compositions, sample compaction, and final sample morphology will be provided.	A measurement scale will be used whenever possible and in-the-picture tags will be used to provide labeling of photographs	NA. Indoor film or a digital video camera will be used.	NA. Narration will be used to provide a record of the interpretation of the video.

Equipment	Measure	Calibration	Primary Standard	Secondary Standard
Building 849				
Load Frame – MTS Geomechanics Laboratory	Load applied	The load cell will be annually calibrated by MTS and the calibration certificate will be on file in the project records.	The primary standard is defined in the MTS procedure for balance calibration. NIST-traceability will be maintained.	None
Band Saw[A]	No measurements will be taken	No calibration is required	None	None

[A] The band saw will only be used to trim waste samples if they can not be compacted directly in the stainless steel forms.

To assure acceptable accuracy and reliability, each piece of equipment used for sample preparation activities will be maintained and calibrated according to the procedures provided by its manufacturer. If these procedures are unavailable or deficient, calibration procedures will be developed and reviewed following the guidelines provided in NP 12-1 and NP 5-1. In addition, all requirements identified in NP 12-1 regarding staff qualification and training, calibration records including calibration labels, and unique identification and traceability of measurement standards to the National Institute of Standards and Technology (NIST) or other nationally-recognized standard will be observed.

2.4 Raw Material Acquisition and Procurement

Materials will be acquired from routine laboratory processes (plastics, glass ware, paper products such as Kim Wipes), from sources such as junk yards (discarded fire brick, graphite foundry parts, concrete, sheet metal, discarded piping and reinforcing steel), from SNL facilities such as laboratories or reapplication (plastic and rubber-based trash, PVC pipe, cooper pipe, wood, plastic containers, from donations from home shops (rags, plastics, wood, metal objects), and from purchases (sorbents, stabilized oils and resins, sludges, portland cement).

There are four primary waste classifications:

1. Compressible; typically having a large amount of void space and representative of contaminated paper, rags, plastic and rubber-based trash produced in abundance by both laboratory and production activities. This compressible waste was often referred to as “combustible” in prior similar studies.
2. Rigid; containing broken and discarded glass, graphite foundry parts, fire brick, and construction debris including concrete, wood, sheet metal, and elongate objects such as wooden 2x4’s, discarded piping and reinforcing steel.
3. High density, semi-plastic; primarily low compressibility paste-like materials, principally stabilized oils, resins and (inorganic) sludges.
4. Rigid monoliths; postulated that only a very few drums (Portland cement stabilized organic complexing agents from Rocky Flats) meeting this criterion are expected, and so it is not a major waste category.

The exact waste compositions by weight and material will be specified in a memorandum requesting sample fabrication. The weights of each large component (e.g., individual metal pieces) and each aggregate component (bulk plastic from rubber gloves, all ¼” inner diameter PVC pipe cut into 5” sections) and subsets of the individual components (n=3 at a minimum) of aggregate components will be recorded. The percent by weight of the components will be documented as well. The materials will be as clean as possible so as not to introduce any undesired contaminates into the samples. However, since some of the

components will be recycled materials, metal pieces may be corroded or rubbers and plastics already partially degraded from use.

2.5 Material Handling and Storage

Raw materials and samples are required to be stored under conditions that will not affect the weight and composition of the materials or samples. Sample integrity must be maintained to keep the samples free from pests, insects, dust and dirt. Although there are no specific temperature requirements for materials or sample storage, samples must not be stored in temperature extremes causing brittleness, melting, or other conditions affecting integrity. Also, materials and samples must be stored in areas that are not open to the weather or where excessive humidity or moisture might affect the materials or samples or sample labeling. Previously tested vertical sediment flume samples required dipping in wax to facilitate transfer from the compression chamber to the cuvette used for analysis. However, it is most efficient to compact the samples in a form that can be used directly for testing.

2.6 Sample Preparation and Labeling

Each container or sample will be labeled according to the general format specified below:

Test Type	**Test Number[A] and Alphanumeric (replicate)**	**Container Contents**	**Container Position[B]**
¼ -	1, 1a, 1b, 2, 2a, 2b	S-(Sand)	Si-(Single)
	And so on	C-(Compressible)	1-7 (7-Pack Test)
		M-(Metallic)	1-21 (3-Tiered, 7-Pack Test)
		D-(Sludge)	
Full -		S-(Sand)	Si-(Single)
		C-(Compressible)	1-7 (7-Pack Test)
		M-(Metallic)	1-21 (3-Tiered, 7-Pack Test)
		D- (Sludge)	
VS (vertical sediment flume)-	1, 1a, 1b, 2, 2a, 2b	S-(Sand)	NA
	And so on	C-(Compressible)	NA
		M-(Metallic)	NA

[A] If there is a need to reload the test, this will be indicated by using a decimal and a reload number. For example, if test a is reloaded, then the reload will be referred to as 1.1a.

[B] The container position within the 3-Tiered 7-Pack will be documented in the scientific notebook. The positional numbering scheme will begin with 1, 8, or 15 as the center number. The lower tier will be numbered 1-7, the middle tier will be numbered 8-14, and the upper tier will be 15-21. The second number assigned (2, 9, 16) will begin in the north direction and continue around in a clock wise direction until all numbers are assigned.

For example, the sample ID ¼-1a-S-Si refers to a container used in a ¼-scale single can test, the first replicate in the test series, and a container filled with sand. The sample ID, Full-3-C-18 refers to a container within a 3-Tiered 7-Pack test that is filled with compressible materials. This is the 3rd test of this kind performed. Position #18 and the details of the third test will be described in the scientific notebook.

Actual container labels may be somewhat modified to provide test-specific information. All container labeling codes keys will be documented in the scientific notebook. ¼-scale containers will be metal cans approaching an ideal specification of:

Ideal ¼-Scale Dimensions	
Diameter	5.693 in
Height	8.70 in
Thickness	
side/top/bottom	0.015 in

Full-scale containers will be standard (UN 1A2/X423/S) 55-gallon drums specified for solid waste disposal. Stainless steel or other forms used to prepare vertical sediment flume samples will be 15 cm x 15 cm.

2.7 Sample Storage and Control

Samples shall be identified and controlled in accordance with NP 13-1 (Sample Control) and SP 13-1 (Chain of Custody). The combined procedures specify approaches for labeling and identification, chain of custody, sample storage, environmental controls, and sample disposition. Specimens will be prepared in Albuquerque, NM. Sample preparation specifications will follow documented procedures and any additional details will be documented using a scientific notebook. Specimen preparation is expected to include assembly of surrogate waste components, compaction, and testing for erodibility and flow. Sample storage is previously addressed in Sections 2.2 and 2.5

2.8 References

Science Applications International Corporation (SAIC). 1989. Data Package for Material Compaction and Drum Collapse Testing: Phase II: Drum Collapse Data. Technical Procedure, Laboratory Safety, SAIC/RML-WIPP-TPSA, Rev. 0 Prepared by SAIC, Las Vegas, NV for Sandia National Laboratories, Albuquerque, NM 87185. (WPO# 26468)

SP 20-3, Calibration Use and Maintenance of Balances Used for Waste Surrogate Development

2.9 Forms

This procedure has no associated forms other than those associated with mentioned NPs or SPs.

3.0 Records

Sample preparation steps and sample composition will be documented using scientific notebooks. A Data Package documenting information such as the following will be created and submitted to the NWMP Records Center: sample requirements, composition, appearance (photographic documentation), preparation, sample labeling, subsampling, and sample storage, tracking, and disposition.

4.0 Appendices

Appendix A: Reviewers and Required Signatures

Appendix A
Reviewers and Required Signatures

If the procedure is revised, the revision will be reviewed by either the original reviewers or by a reviewer with the same level of expertise. This Appendix is provided to document the list of original reviewers and to provide information to select the appropriate reviewers for subsequent revisions.

	Printed Name	Signature	Date
Author:	Deborah S. Coffey, 6832		
QA Reviewer:	Norb F. Tencza, 6811		
Technical Reviewer:	Daniel A. Lucero, 6832		
Technical Reviewer:	Nancy S. Brodsky, 6117		
ES&H Coordinator	Tanya McMullen, 6500		
MOC Manager of Industrial Safety[1]	NA		

[1] Work covered under this procedure will not be conducted at the WIPP site, and therefore, the MOC manager's signature is not needed.